

# PROJECT facts

DEPARTMENT OF ENERGY  
OFFICE OF FOSSIL ENERGY

ADVANCED power  
SYSTEMS

## ABB-CE's LOW EMISSION BOILER SYSTEM (LEBS)— MORE POWER WITHOUT HIGHER COSTS

### PRIMARY PROJECT PARTNER

ABB-Combustion  
Engineering, Inc.  
Windsor, CT

### MAIN SITE

Windsor, CT

### TOTAL ESTIMATED COST

\$104,720,000

### COST SHARING

DOE	\$41,774,000
Non-DOE	\$62,946,000

### Project Description

ABB-Combustion Engineering is leading a team of U.S. companies in designing a highly advanced pulverized-coal-fired boiler system to replace today's aging plants. For several years, the U.S. Department of Energy has sponsored the development and testing of innovative emissions-control technologies, primarily for retrofit to existing boilers. The ABB team is currently integrating these environmental technology advances with state-of-the-art boiler design and highly efficient power-plant construction methods to meet tomorrow's power and environmental demands.

To control nitrogen, sulfur, and particulates, ABB is using the "Hot SNOX™" process. This process uses the unique CeraNOx filter, which traps particulates and reduces nitrogen oxides (NOx) in a single, compact device that is much smaller than a bag filter or electrostatic precipitator. The sulfur dioxide (SO<sub>2</sub>) is removed catalytically, requiring no sorbent and producing no waste. This process generates sulfuric acid, a saleable commodity.

Very high plant efficiencies—up to 50%—will be reached by incorporating Kalina Cycle technology, which achieves a higher thermodynamic efficiency by using a mixture of ammonia and water, instead of ordinary steam, as its working fluid.

### Program Goal

Coal is by far the Nation's most abundant energy resource, but burning coal to generate energy could produce harmful emissions if not controlled. DOE's strategic plan aims not only to ensure a reliable and affordable energy supply for the U.S., but to minimize environmental impact as well. The highly advanced coal-fired Low Emission Boiler System will achieve significantly lower emissions and higher plant efficiencies than conventional units. This system will also deliver electricity at costs no higher than those of current pulverized-coal-fired plants. The success of the program will place our Nation in a strong position to supply power-generation and environmental-control systems to a fast-growing world market.

### Project Partners

RICHMOND POWER & LIGHT  
Richmond, IN  
(host site for proof-of-concept test facility)

RAYTHEON ENGINEERS AND CONSTRUCTORS  
Philadelphia, PA  
(balance-of-plant design and architect-engineering services)

ABB-ENVIRONMENTAL SYSTEMS, INC.  
Birmingham, AL  
(emissions control)

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## CONTACT POINTS

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## Project Benefits

In the near future, the United States will have to build a new generation of coal-based power plants to replace its aging units. Coal supplies more than 56% of the Nation's electricity, and, because of our abundant reserves, it will remain the dominant source of fuel for power generation well into the next century. A national cap on sulfur and NOx emissions, however, will require future coal technologies to be much cleaner than current technology.

DOE is sponsoring the Low Emission Boiler System program to meet these power and environmental needs. Without significantly departing from the traditional design features of pulverized-coal-firing systems, this technology will:

- Reduce SO<sub>2</sub> and NOx emissions to a sixth of the levels allowed by today's Federal air quality standards (New Source Performance Standards).
- Lower emissions of flyash and other particulates to a third of those allowed by today's standards.
- Significantly improve power-plant efficiency—up to 50% from today's level of 35%.
- Produce electricity at costs equal to or less than those of a modern-day coal plant.

LEBS is one of several advanced power-generation systems that are being developed with support from DOE. Of these systems, LEBS offers the nearest-term commercial option for utilities to meet the above performance goals for new installations. In addition, many of the technologies that are being developed in the LEBS program will be available for retrofit or repowering applications at existing facilities.

ABB-Combustion Engineering, along with Babcock & Wilcox and DB Riley, is leading teams that are independently developing Low Emission Boiler Systems that incorporate each team's unique, preferred technologies. In mid-1997, one of the teams will be selected to construct and operate a proof-of-concept (POC) test facility to provide the engineering data needed to commercialize their system by the year 2000.

## Cost Profile (Dollars in Millions)

	Prior Investment	FY95	FY96	FY97	Future Funds**
Department of Energy *	\$5.5	\$2.1	\$2.8	\$7.4	\$24.0
Private Sector Partners	—	\$1.0	\$1.3	\$6.5	\$54.0

\* Appropriated Funding

\*\* If ABB is selected to perform POC testing, the final phase of the LEBS development effort, a total of approximately \$90 million (\$30 million DOE) will be required, with \$6 million needed in FY97.

## Key Milestones

FY91	FY92	FY93	FY94	FY95	FY96	FY97	FY98	FY99	FY00
Concept development Preliminary R&D Component testing Commercial generating unit: preliminary design			Subsystem testing Proof-of-concept: facility design Host site selection for proof-of-concept facility			Proof-of-concept facility: revised design Commercial generating unit: revised design		Construction and operation of proof-of-concept facility	